



## The Effect of Push-Up Exercise and Dumbbell Exercise Overhead The Passing Ability of Volleyball Games of SMPN 20 Makassar Extracurricular Participants

Anshari H. P. Ishak<sup>1\*</sup>, Hikmad Hakim<sup>2</sup>, Sahabuddin<sup>3</sup>, Muh. Adnan Hudain<sup>4</sup>,  
Ahmad Rum Bismar<sup>5</sup>

<sup>1,4</sup>Program Study of Postgraduate in Physical and Sports Education / Makassar State University /  
Makassar / South Sulawesi / Indonesia

<sup>2,3,5</sup>Program Study of Sports Coaching Education / Faculty of Sports Science / Makassar State University  
/ Makassar / South Sulawesi / Indonesia

<sup>1,4</sup>Street Bonto Langkasa, Banta-Bantaeng, Subdistrict Rappocini, Makassar City, South Sulawesi 90222

<sup>2,3,5</sup>Street Wijaya Kusuma Raya No. 14 (Kampus Banta-Bantaeng) Makassar City, South Sulawesi, 90222

<sup>1\*</sup>[anshariishak104@gmail.com](mailto:anshariishak104@gmail.com), <sup>2</sup>[hikmad.hakim@unm.ac.id](mailto:hikmad.hakim@unm.ac.id), <sup>3</sup>[sahabuddin@unm.ac.id](mailto:sahabuddin@unm.ac.id),

<sup>4</sup>[muh.adnanhudain@unm.ac.id](mailto:muh.adnanhudain@unm.ac.id), <sup>5</sup>[ahmad.rum.bismar@unm.ac.id](mailto:ahmad.rum.bismar@unm.ac.id)

*Received:* July 25, 2023; *Reviewed:* July 28, 2023; *Accepted:* August 02, 2023;

*Published:* October 25, 2023

### ABSTRACT

*This researcher aims to determine the effect of push-up exercises and dumbbell exercises on the overhead passing ability of volleyball extracurricular participants at SMPN 20 Makassar. The population in this study were students of SMP Negeri 20 Makassar. A sample of 40 people was taken based on random sampling. The dependent variable of the research is the ability to pass under volleyball. The independent variables are push-ups and dumbbell exercises. The research method is an experimental method with a one-group pretest-posttest research design. The research data were analyzed using paired and unpaired t-test techniques at a significance level of 95%. The results of the study showed that: (1) There was a significant effect of push-up training on the passing ability of volleyball extracurricular participants at SMPN 20 Makassar. The results of testing the data obtained a t-count value of 15.891 and t-table obtained 1.729 and a significance value of  $0.000 < \alpha 0.05$ , so these results indicate that there is a significant difference. Because the t-count is greater than the t-table, so  $H_0$  is rejected. (2) There is a significant effect of dumbbell training overhead passing ability in volleyball extracurricular participants at SMPN 20 Makassar. The results of data testing obtained a t-count value of 14.311 and t-table obtained 1.729, and a significance value of  $0.000 < \alpha 0.05$ , so these results indicate that there is a significant difference. Because the t-count is greater than the t-table, so  $H_0$  is rejected. And (3) there is a significant difference in the effect of push-ups and dumbbell exercises on overhead passing abilities in volleyball extracurricular participants at SMPN 20 Makassar. The results of data testing obtained a t-count value of 3.440 and a t-table obtained 2.021, and a significance value of  $0.001 < 0.05$ , so these results indicate that there is a significant difference. Because the t-count is greater than the t-table, so  $H_0$  is rejected. The magnitude of the increase in the push-up group (average value 16.4500) with dumbbell exercises (average value 13.9000) can be seen from the data with an average difference of 2.5500 points. This shows that push-up exercises can improve passing skills in volleyball games for extracurricular participants at SMPN 20 Makassar compared to dumbbell exercises.*

**Keywords:** Exercise; Push-Ups; Dumbbells; Overhead Pass; Volleyball.

## INTRODUCTION

Volleyball is a sport that is very popular in the community, therefore improving students' volleyball playing skills in a school is a must after seeing the enormous demands from society (Ikadarny & Karim, 2020). Therefore the teacher is an academic or education provider as well as a motivator in the educational process and has an important role in achieving educational goals (Sahabuddin et al., 2021). There is no need to doubt the goodness and benefits of playing volleyball as a school sport, although there are still less profitable things (Wisniarti & Hermanzoni, 2020). If those unfavourable things are balanced with the right actions, then there is no doubt that volleyball is chosen as a priority sport in middle and elementary schools (Ilkamto & Saputra, 2020).

Volleyball is one of the sports that is widely contested through inter-school competitions (Saputra & Gusniar, 2019), and based on direct observations in the field, it is clear that basically, junior high school students are still not proficient in mastering the various basic techniques of this game properly and correctly (Sahabuddin, 2020). This is because the development of interest and talent in this sport is still not optimal compared to other sports (Masrun, 2020). In volleyball games, there are basic training that volleyball athletes must first master, namely service, passing, smash/spike, and block/hold (Sudibyo et al., 2020). Mastery of the basic techniques of playing volleyball is one of the elements that determine the win or loss of a match (Baidawi & Maidarman, 2019), so the basic techniques of playing volleyball must be mastered first to develop the quality of playing volleyball (Isman et al., 2020). Volleyball is a team sport, so players must work together and support each other to become a strong and compact team (Jahrir, 2019). Thus mastery of the basic techniques of playing volleyball individually is necessary for a volleyball player (Sahabuddin et al., 2021). Perfection in doing basic techniques can only be mastered properly if you do regular exercises and program them properly (Ruslan, 2021). Mastery of the basic techniques of playing volleyball is one of the elements that also determines the win or loss of a team in a match, in addition to elements of physical, tactical and mental conditions (Daulay & Nasution, 2021).

Passing over is a technique that prioritizes strength in the fingers of both hands (Afdi et al., 2019). Usually, this technique is done more when the player is about to make the next pass, the last punch or smash is done by another friend. Players who are required to have more skills in this technique are those who are positioned as tossers or feeders. A tosser must be able to provide perfect bait to other players to do a perfect smash. Witono Hidayat (2017).

Doing the correct overhead passing technique is that both legs must be slightly bent to help produce a good throw. Both hands are beside with the position of the palms open. When the ball arrives, your palms face the ball and touch it with your fingertips. To be able to do overhead passing properly, various kinds of exercises are needed including push-up exercises and dumbbell exercises. The dumbbell training method is a very important element in improving skills, especially in achievement development, because the dumbbell training method provides habituation so that there will be perfect coordination of motion. Dumbbells are small barbell-like tools. This tool can only be lifted with one hand for arm muscle strength, which is very much needed in volleyball games, especially in passing, as stated by Sadoso (Suroso, 2013).

Of the several movement processes that occur in the overhead passing movement technique, there are two movements that the author believes have an important role in improving the quality of the overhead passing (Sahabuddin, 2020), the first is when carrying out the overhead passing movement to be able to receive the direction the ball is coming from and feed it to various directions of the ball that will be given to a spiker making it difficult for the opponent to return the ball, it is in this movement that the overhead passing factor plays a role in achieving points in a match because with good overhead passing the spiker can easily smash to kill the ball in the opponent's area. The second is when a player makes a pass, especially a jump toss by pushing the ball against a ball that is inflated and will be hit by a spiker in the right position, in this movement an important factor is seen in the readiness of the tosser to pass over perfectly.

One of the schools that organizes physical education, sports education and health education is SMPN 20 Makassar. SMPN 20 Makassar is an educational unit with a junior high school level on Jl. Inpeksipam 20 Manggala, Manggala District, Makassar City, South Sulawesi. In carrying out its activities, SMPN 20 Makassar is under the auspices of the Ministry of Education and Culture. Learning at SMPN 20 Makassar is held in the morning. In a week, learning is carried out for 6 days. There are various extracurriculars in this school. Meanwhile, extracurricular activities at this school are carried out 3 times a week. Based on the observations of researchers at SMPN 20 Makassar extracurricular male students, there are still many who have not fully mastered the basic techniques of playing volleyball properly and correctly, especially the basic techniques of passing over. When passing, many students make mistakes such as hands being too straight and too tight, legs standing too stiff, and foot movements that are not agile.

Apart from that, in terms of implementation, there are still many obstacles encountered by teachers or coaches, such as a lack of training materials, media or even sports facilities, where these obstacles become the main obstacle to the ongoing training process so that the goals to be achieved through the training process very difficult to achieve. This certainly affects the ability of students in terms of talent development (Sahabuddin et al., 2023).

How can research formulate problems in observations that occur in volleyball matches that have been carried out at SMPN 20 Makassar? From the records obtained during the game, a lot of smashes were done but did not get points because they did not cross the net, this was caused by the bait given by the tosser was not perfect. Starting from the overhead passing technique, an observation that the author found regarding this overhead passing is one of the techniques to support attacks through the role of a setter or feeder. The lack of enthusiasm of the players in learning the overhead passing technique is because they still think it is not a fun technique compared to the spike/smash.

Incorrect finger position on the tosser player. Another mistake that often occurs when passing over is the wrong finger position (Ishak et al., 2023). Fingers that are open or too wide and also too straight will not form a bowl basin. The result is that something like this will make the ball become unstoppable so that it releases and also falls into the team's area. This is caused by the tosser's hand which is too weak when preparing the position of the fingers for it needs appropriate training so that the fingers of the players, especially the tosser, become strong.

The elbow position is not in a perfect state caused by the wrong elbow position. One of the mistakes in making a top pass. If the position of the elbow when passing is too outward or even too inward, it will cause the fingers and palms to become too flat. This scattered hand position will later cause the ball to become unable to be accommodated so that it falls into the team's defence area. This movement is supported by the strength of the arm where when the strength of the arm can reach the maximum load of muscle contraction ability, the ball that comes will feel lightly moved by the tosser so that it can adjust the position of the hand in its perfect state in doing the overhead pass. Another mistake in passing over is that the arm goes straight up too early before the ball arrives. This, of course, can cause the hand to lose strength to do passing. And it's better if the arms don't go straight up before the ball comes so you don't lose or lack power.

Most students of SMPN 20 Makassar when passing over the position of the fingers when going to pass over are not open and tend to be very weak. This can cause the ball to slip and fall into your area. Of course, it is very important to form a palm with fingers open

and tense so that the ball can be trapped.

At SMPN 20 Makassar, physical training to increase arm muscle strength lacks exercise variations, and other physical exercises are less balanced as a support for improving the athlete's physical condition. Physical exercises performed using dumbbell curls. Due to the lack of tools in junior high schools that are used for training and the lack of variety of exercises given during physical training, the results of volleyball games are unsatisfactory, because the basic volleyball techniques cannot be done properly. One of them is the top pass, the weakest volleyball basic technique is the top pass. In carrying out passing, it is still weak, so sometimes the ball does not reach the intended target, which makes it difficult for other players to save the ball.

Weak overhead passing so that volleyball games don't go well, because they can't carry out strategies in volleyball games due to weak basic volleyball techniques. Thus the researchers thought to hold a variation of the exercise by adding to the physical exercise that had been done with other exercises, namely push-up exercises and dumbbell exercises, these exercises included weight training exercises in strengthening arm muscle strength exercises, namely push-up exercises and dumbbell exercises.

Why Was This dumbbell exercise chosen the exercise performed is a lifting movement so it is suitable for practising the upper pass movement so that it is better than before. In addition, physical exercise has never been done. In its implementation, it is guided by the supervisor who is in that place. To find out how the results are after being given additional exercises with push-up exercises and dumbbell exercises.

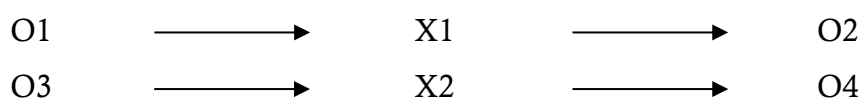
Through this research, it is hoped that it can improve the mastery of correct passing techniques so that it can support technical skills in playing volleyball for the better. By evaluating it through the observation process while SMPN 20 Makassar students are practising volleyball games, it is clear that the passing abilities of SMPN 20 Makassar students are not perfect due to weakening of the fingers and arm muscle strength resulting in the automation of correct movement passes by the tosser. sometimes perfect and sometimes not. Doing a good pass is not an easy thing. For novice students, they often do not pass perfectly, they don't even rule out the possibility of the ball running away from control. Errors that often occur when passing, one of the contributing factors is not having mastered the ball passing technique material properly. For students to master the ball-passing technique correctly, a good learning method is needed. In the implementation of passing learning in volleyball games, it is necessary to apply the right learning method so that the ability to pass properly is obtained.



## METHOD

This research is a field experiment research with a two-group test research design. According to (Sugiyono, 2013) the experimental research method can be interpreted as a research method used to look for the effect of certain treatments on others under controlled conditions. This study compared the pretest (before treatment) and posttest (after treatment). With the treatment of push-ups and dumbbell exercises on the passing ability of SMPN 20 Makassar students.

The research design used a two group pretest-posttest design with the following image designs:



In this research, the population is SMPN 20 Makassar students. As with population characteristics, a sample that represents a population is a sample that is selected according to the characteristics of that population. The sample is a portion of the population taken using a sampling technique (Hardani, et al., 2020: 363). According to (Suyito, 2015) the sample is a small part of the population taken according to certain procedures that can represent the population. The sampling technique for this study was double sampling with quota sampling and purposive sampling methods.

This test instrument uses a French Cooper volleying ball target. The target wall is 2.24 meters high for women and 2.43 meters for men, with a width of 3 meters, the boundary where the testicles stand from the wall is 1 meter. Because what will be studied by male volleyball players is a wall target as high as 2.43 meters.

The normality test aims to determine whether or not the distribution of the data to be analyzed is normal. Normality testing was carried out using the Kolmogorov-Smirnov test with the help of SPSS 22. This test will test the distribution of data originating from populations with normal distribution. Then a homogeneity test was carried out to accept or reject the significance hypothesis with 0.05. The criterion for accepting the hypothesis is if the significance value is greater than 0.05. If it does not meet these criteria then the hypothesis is rejected. After the normality test and homogeneity test, hypothesis testing was carried out in this study, namely that there was an effect of push-ups and dumbbell exercises on overhead passing ability in volleyball games, a T-test was carried out.

## RESULTS AND DISCUSSION

### Research result

**Table 1.**

Descriptive results of passing ability data on volleyball games on extracurricular participants at SMPN 20 Makassar

Descriptive	Push-up exercise		Dumbbell exercise	
	Pre-Test	Post-Test	Pre-Test	Post-Test
N	20	20	20	20
Mean	9,8000	16,4500	9,9500	13,9000
Std. Deviation	2,30788	2,32775	2,23548	2,35975
Variance	5,326	5,418	4,997	5,568
Range	9,00	8,00	8,00	8,00
Minimum	6,00	12,00	7,00	10,00
Maximum	15,00	20,00	15,00	18,00
Sum	196,00	329,00	199,00	278,00

The results of the Test of Normality test that was carried out, the results were obtained as attached. The calculation results can be seen in the following summary table:

**Table 2.**

The results of the normality test of passing ability data for volleyball games for extracurricular participants at SMPN 20 Makassar

Variabel	Kolmogorov-Smirnov		Shapiro – Wilk		α	Information
	Statistik	Sig.	Statistik	Sig.		
Push-up exercise	0,186	0,069	0,948	0,340	0,05	Normal
Dumbbell exercise	0,191	0,054	0,917	0,088	0,05	Normal

From the data obtained from the results of the Levene Statistic Test conducted, the results were obtained as summarized in the following table:

**Table 3.**

The results of the homogeneity test of passing abilities in volleyball games for extracurricular participants at SMPN 20 Makassar

Pre-Test	Levana Statistic	Sig.	α	Information
Push-up exercise & Dumbbell exercise	0,100	0,754	0,05	homogenous

In testing the homogeneity of the sample, the calculations listed in the summary above, using the Levene Statistical Test at a significant level of 95%. From the results of these calculations, the Levene Statistic Test value is 0.100 with a probability level of 0.754 which is greater than the value of  $\alpha 0.05$ . Therefore, from the results of these calculations, it can be concluded that the two exercise groups, namely push-up exercises and dumbbell exercises, are homogeneous.

**There is an effect of push-up training overhead passing ability in volleyball games for extracurricular participants at SMPN 20 Makassar.**

**Table 4.**

Test the difference in the mean of paired samples of the push-up exercise group

<i>Overhead Passing Volleyball</i>	<i>Mean</i>	<i>Mean Differences</i>	<i>t</i>	<i>Df</i>	<i>Sig (2-tailed)</i>	<i>t-table</i>	
Group A	<i>Post-test</i> <i>Pre-test</i>	16,4500 9,9500	6,6500	15,891	19	0,000	1,729

Based on the table above, the t-test has pretest and posttest values for push-up exercises as follows. The results of testing the data obtained a t-count value of 15.891 and t-table obtained 1.729 and a significance value of  $0.000 < \alpha 0.05$ , so these results indicate that there is a significant difference. Because the t-count is greater than the t-table, so  $H_0$  is rejected, thus meaning that there is a significant effect of push-up training overhead passing ability in volleyball games in extracurricular participants at SMPN 20 Makassar. The magnitude of the increase in push-up exercises can be seen from the data with an average difference of 6.6500 points.

**There is an effect of dumbbell training overhead passing ability in volleyball games for extracurricular participants at SMPN 20 Makassar.**

**Table 5.**

Test the difference in the means of paired samples of the dumbbell exercise group

<i>Overhead Passing Volleyball</i>	<i>Mean</i>	<i>Mean Differences</i>	<i>t</i>	<i>Df</i>	<i>Sig (2-tailed)</i>	<i>t-table</i>	
Group B	<i>Post-test</i> <i>Pre-test</i>	13,9000 9,9500	3,9500	14,311	19	0,000	1,729

Based on the table above, the t-test has pretest and posttest dumbbell training values as follows. The results of testing the data obtained a t-count value of 14.311 and t-table obtained 1.729, and a significance value of  $0.000 < \alpha 0.05$ , so these results indicate that there is a significant difference. Because the t-count is greater than the t-table, so  $H_0$  is rejected, thus meaning that there is a significant effect of dumbbell training overhead passing ability in volleyball games in extracurricular participants at SMPN 20 Makassar. The magnitude of the increase in dumbbell exercises can be seen from the data with an average difference of 3.95000 points.



**There is a difference in the effect of push-up exercises and dumbbell exercises on overhead passing abilities in volleyball games for extracurricular participants at SMPN 20 Makassar.**

**Table 6.**  
 Unpaired Sample Mean Difference Test

	<i>Overhead Passing Volleyball</i>	<i>Mean</i>	<i>Mean Differences</i>	<i>t</i>	<i>Df</i>	<i>Sig (2-tailed)</i>	<i>t-table</i>
Post	<i>Push Up Exercise</i>	16,4500					
Test	<i>Dumbbell Exercise</i>	13,9000	2,5500	3,440	38	0,001	2,021

Based on the table above, the t-test has a post-test value between the push-up and dumbbell exercise groups as follows. The results of testing the data obtained a t-count value of 3.440 and a t-table obtained 2.021, and a significance value of 0.001 < 0.05, so these results indicate that there is a significant difference. Because the t-count is greater than the t-table, so Ho is rejected, thus meaning that there is a significant difference in the effect between the push-up and dumbbell training groups overhead passing ability in volleyball games in extracurricular participants at SMPN 20 Makassar. The magnitude of the increase in the push-up group (average value 16.4500) with dumbbell exercises (average value 13.9000) can be seen from the data with an average difference of 2.5500 points. This shows that push-up exercises can improve passing skills in volleyball games for extracurricular participants at SMPN 20 Makassar compared to dumbbell exercises.

## Discussion

**There is a significant effect of push-up training overhead passing ability in volleyball games for extracurricular participants at SMPN 20 Makassar.**

Based on the results of research data analysis, it can be seen that there is an effect of push-up training in improving passing skills in volleyball games for extracurricular participants at SMPN 20 Makassar. This is evidenced by the calculated significance value in the one-way t-test of 0.000 which is less than 0.05 (Sig). The magnitude of the increase in push-up exercises can be seen from the data with an average difference of 6.6500 points.

Based on the results of the study, shows that push-up exercises can be used to improve passing results for volleyball in extracurricular participants at SMPN 20 Makassar. This can be seen in the results of the pretest and posttest results after being given the push-up treatment. According to Nasution (2015) in volleyball games, regular physical and mental training is needed to improve playing technique. According to Suandi (2013), overhead passing is one of the basic ball game techniques which has the aim of directing the ball

being played to a teammate or passing it to a target. Therefore, one of the efforts to defend the ball when a player directs or plays the ball from the team itself or to the opposing team requires strong arm muscle strength. Arm muscle strength is the ability of the arm muscles to be able to overcome resistance or loads or also when doing sports activities. Opinion of Prasetyo (2015) Arm muscle strength is the skill of the muscles to generate tension against a tension, the strength that is interpreted in this case is the strength of the arm muscles which is usually measured by push-ups. This is in line with the opinion of Anwar (2015) who argued that push-up exercises aim to increase arm muscle strength which aims to enlarge the muscles automatically and increase the strength of these muscles either pulling or pushing.

The principles of training have a significant role in the psychological and physiological aspects of athletes, mastering the principles of training will support efforts to improve the quality of training (Akbar & Hermanzoni, 2017). In addition, according to Ismoko, et al (2013), sports training is an activity that is carried out at a time and is carried out repeatedly, programmed in the principles of training assignment to build athletes who achieve the highest performance standards.

Based on the opinions of the experts above, it can be concluded that the purpose of the push-up exercise is to train the pelit arm muscles to carry out an initial test or pretest to extracurricular participants at SMPN 20 Makassar, totalling 20 samples. Furthermore, the researcher gave treatment in the form of push-up exercises for 6 weeks with a frequency of 3 meetings. Next, the researcher conducted a final test or posttest on the sample. The results of the experimental group's pretest data on the overhead passing technique with the Brady wall method were an average value of 8.23, while the results of the posttest data obtained an average value of 12.87. Based on research that has been done by researchers push-up exercises can improve overhead passing abilities in extracurricular participants at SMPN 20 Makassar. This can be seen based on the results of the pretest and posttest which have increased after being given the push-up exercise treatment. Researchers gave treatment to 20 samples of extracurricular participants at SMPN 20 Makassar which were carried out for 6 weeks with a frequency of 3 meetings.

Based on the results of research data analysis, shows that push-up exercises can improve overhead passing results in extracurricular participants at SMPN 20 Makassar. This can be seen from the results of the initial or posttest average value of 8.23 before being given treatment. After the researcher gave the treatment, the researcher then conducted a final test or posttest and obtained an average value of 12.87.

Thus the push-up exercise can provide significant results in the form of arm muscle strength which is one way to create good and correct overhead passing results. This is in line with Suharjana (2012) to train arm muscle strength, one form of exercise is with one's body weight, namely push-ups. In particular, the increase in skills resulting from passing above is adjusted to the characteristics and support needed for students participating in extracurricular activities at SMPN 20 Makassar.

**There is a significant effect of dumbbell training overhead passing ability in volleyball games for extracurricular participants at SMPN 20 Makassar.**

Based on the results of research data analysis, it can be seen that there is an effect of dumbbell training in improving passing skills in volleyball games for extracurricular participants at SMPN 20 Makassar. This is evidenced by the calculated significance value in the one-way t-test of 0.000 which is less than 0.05 (Sig). The magnitude of the increase in push-up exercises can be seen from the data with an average difference of 3.9500 points

Looking at the results of the data analysis that has been found above, it can be seen that the dumbbell training method which was carried out for 6 weeks with a frequency of three times a week influenced the overhead passing ability. This is in line with the theory and research results put forward by Nurhasan (2011) which states that an effective exercise frequency should be done 3-5 times a week, whereas if it is less than 3 times a week it will not have an impact on the body. The use of the correct training method is one of the factors to increase the desired achievement and is supported by motivation and sincerity in carrying out the exercise. According to Venerando (in Budiwanto, 2004), "practice by systematically repeating aims to achieve better skills". According to Harsono (2015) says that "exercise or training is a systematic process of training or working repeatedly with an increasing amount of load day by day".

Referring to this research, a student to play volleyball should respond positively to the importance of training, especially exercises to increase arm muscle strength which is a very important component for a student in doing overhead passing. Theoretically, in this study dumbbell exercises are a form of exercise that is effective enough to be used in exercises to increase arm muscle strength. The results of the study showed that there was an effect of dumbbell training on overhead passing ability in volleyball games at SMPN 20 Makassar extracurricular volleyball.

Overall it can be said that the research hypothesis has been accepted and answers the problems and objectives of this study. And with the influence of dumbbell training and the

provision of training material that is by the principles of training on upper serve ability, dumbbell training can be used as an exercise to improve overhead passing ability in volleyball games.

**There is a significant difference in the effect of push-up exercises and dumbbell exercises on overhead passing abilities in volleyball games for extracurricular participants at SMPN 20 Makassar.**

Based on the results of the analysis of the research data, it can be seen that there is a significant difference in the effect of push-ups and dumbbell exercises on the passing ability of the volleyball game in extracurricular participants at SMPN 20 Makassar. This is evidenced by the calculated significance value in the two-way t-test of 0.001 which is less than 0.05 (Sig). The magnitude of the increase in push-up exercises can be seen from the data with an average difference of 2.5500 points

The arm is one of the upper legs or upper extremities in the human body which functions to perform movements such as lifting, pushing, pulling, hitting, rejecting, and throwing. Kristanto's opinion (2020) is that the length of the arm is the distance from the upper bone of the arm (humerus) to the ulna. The sleeve length is the length of the hand from the acromion to the wrist. The arms are included in the extremities of the joints in the human body. The arm has three parts of the muscles that support the arm including the shoulder muscles, the base muscles of the upper arm, and the muscles of the forearm. The muscles in the arm are located in the upper leg of the human body, divided into the upper arm and forearm. The arm as part of the upper leg, functions to make pulling movements, holding or rejecting an object.

The arm is one of the upper legs which is arranged based on the bony framework and a group of muscles that wrap it. The arm muscles that work dominantly are the tricep brachii, deltoid, and bicep brachii muscles (Saparudin, 2019). It is explained as follows: (1) Upper arm muscles: (a) ventral muscles are called upper (flexion) muscles, (b) dorsal or kedang (extension) muscles; deltoids, biceps brachii, triceps brachii. (2) Forearm muscles: ventral muscles, radial muscles, dorsal muscles. Hand muscles: (a) Thenar muscles/ thumb/ lateral parts: abductor pollicis bervis, opponeus pollis, flexor pollisis, abductor pills. (b) Hypothenar/ little finger/ medial muscles: palmers brevis, abductor digit quinti, flexor digit quinti, opponeus digiti quinti. (c) The muscles of the inside of the arm/middle part: lubricates, dorsal intersession, volar intersession. The arm muscles consist of the upper arm muscles and the forearm muscles. According to Syaifuddin (2016) the upper

arm muscles consist of flexor muscles, namely M. Bicep Braki, M. Brachialis, M. Koracobrachialis, and extensor muscles, namely M. Triceps Braki. The forearm muscles consist of extensor carpi radialis longus, extensor carpi radialis brevis, extensor carpi ulnaris, supinator, pronator teres, flexor carpi radialis, palmaris longus, flexor carpi ulnaris, flexor digitorum deep, extensor digitorum.

Volleyball players need good physical condition. Maizan (2020) states that physical condition does not only affect technical improvement but also increases tactics. Improving tactics will not work if you have not mastered the technique properly, and are supported by good physical condition. The physical condition of the players will also affect the mentality of the players, and conversely, the players' mentality will also affect the physical condition as well as the players' techniques and tactics. Technique, tactics, and mental and physical condition are the most important elements to create a good game. Physical condition is closely related to the body's ability to complete the work tasks performed. Physical condition is very decisive for someone to optimize the techniques learned, good physical condition is the main requirement for mastering and developing a sports technique skill.

Volleyball athletes need good-quality physical conditions, the basic components of these physical conditions are: "power, speed, strength, endurance, flexibility, agility), and coordination" (Syamsi et al., 2021). Physical condition is an important element and forms the basis for developing techniques, tactics, and strategies in playing volleyball. In situations of high physical and psychological stress, the prime physical condition of a player will usually also be able to increase self-confidence, reduce psychological stress and overcome other negative psychological symptoms. Players before being deployed in a competition arena, must be in a good physical condition to deal with the high intensity of work and all kinds of stress that will be faced.

Push-up exercises and dumbbell exercises are two forms of exercise that aim to improve the physical condition of muscle strength in the arms. By following the training principles given during the research. The push-up exercise given in the study is an internal load, which means that a student's body weight is made directly into the load during exercise. While the dumbbell exercises carried out during the study used external loads which were used as loads during exercise.

However, seeing that the research object is junior high school students, the results of the research data show that push-up exercises are more optimal for increasing arm muscle strength and physical condition abilities in students. This is analyzed from the motion that



is carried out, that the two palms are open by pushing down more to build up to form a physical condition of strength in the arm muscles and giving full strength to both palms that are open to being able to help push the ball when carrying out the volleyball passing technique. While the dumbbell exercises are still not optimal, because each hand holds a dumbbell in a gripping position, the result is that the students in the group feel stiff when doing the passing movement for volleyball.

## CONCLUSIONS AND SUGGESTIONS

Based on the results of data analysis and discussion, it can be concluded that the research is as follows:

1. There is a significant effect of push training overhead passing ability in volleyball games for extracurricular participants at SMPN 20 Makassar.
2. There is a significant effect of dumbbell training overhead passing ability in volleyball games for extracurricular participants at SMPN 20 Makassar.
3. There is a significant difference in the effect of push exercises and dumbbell exercises on overhead passing abilities in volleyball games for extracurricular participants at SMPN 20 Makassar.

For the results of this research to be utilized in a positive direction and to enrich the repertoire of sports science disciplines, suggestions can be put forward as follows:

1. Students, gain experience in training so that push-up exercises and dumbbell exercises can be used as training media to improve overhead passing skills in volleyball games.
2. Physical education teachers, add insight and information as well as a reference or guide in training the strength of the fingers so that they can perform optimal passing for volleyball games through the media of push-up exercises and dumbbell exercises.
3. Schools, as input material to determine the development of students' physical abilities or sports achievements to improve student achievement and support school prestige.

## REFERENCES

- Afdi, R. B., Zulman, Z., & Asmi, A. (2019). Pengaruh Model Latihan Passing Terhadap Kemampuan Passing Bawah Dan Passing Atas Pemain Bolavoli. *Sport Science*, 19(1),

- 33–40. <https://doi.org/10.24036/jss.v19i1.26>
- Baidawi, T., & Maidarman. (2019). Minat Siswa Terhadap Pembelajaran Bolavoli. *Jurnal Patriot, Kepelatihan, FIK Universitas Negeri Padang*, 2(5), 1300–1306. <http://patriot.ppj.unp.ac.id/index.php/patriot/article/view/420>
- Budiwanto. (2017). *Metode statistika untuk mengolah data keolahragaan*. Malang: UNM Pres.
- Daulay, D. E., & Nasution, A. F. (2021). Meningkatkan Passing Bawah Bola Voli Melalui Variasi Latihan Drill Pada Club Bola Voli Asahan Jaya 2021. *Jurnal All Fields of Science J-LAS*, 1(1), 25–30.
- Harsono. (2015). *Kepelatihan olahraga. (Teori dan metodologi)*. Bandung: Remaja Rosdakarya.
- Ikadarny, I., & Karim, A. (2020). Kontribusi Koordinasi Mata Tangan, Kekuatan Otot Lengan, dan Keseimbangan Terhadap Kemampuan Passing Bawah Pada Permainan Bola Voli. *Jendela Olahraga*, 5(1), 65. <https://doi.org/10.26877/jo.v5i1.4299>
- Ilkamto, M., & Saputra, Y. D. (2020). Peningkatan Hasil Belajar Servis Bawah Bolavoli Dengan Menggunakan Metode Problem Solving Pada Peserta Didik Kelas X SMKN 1 Jatirejo Kabupaten Mojokerto Tahun Pelajaran 2017/2018. *Jurnal Sport-Mu Pendidikan Olahraga UM Jember*, 1(1), 33–42. <http://jurnal.unmuhjember.ac.id/index.php/sportmu/article/view/3058>
- Ishak, M., Sahabuddin, & Husniati. (2023). The Effect of Paired and Unpaired Ball Passing Practice on Ball Passing Ability in the Game of Football. *Nusantara Journal Of Sport Science*, 2(1), 8–15. <https://journal.apskorisanjoss.org/index.php/njss/article/view/21>
- Isman, H., Supriatna, E., & Triansyah, A. (2020). Pengaruh Metode Drill Terhadap Keterampilan Passing Bawah Bolavoli Peserta Didik Ekstrakurikuler. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa2*, 9(1), 1–8. <https://jurnal.untan.ac.id/index.php/jpdpb/article/view/38739>
- Jahrir, A. S. (2019). Kontribusi Kekuatan Otot Lengan, Koordinasi Mata Tangan Dan Panjang Lengan Terhadap Kemampuan Passing Bawah Bolavoli Siswa. *Exercise : Journal of Physical Education and Sport*, 1(1), 49–67. <https://doi.org/10.37289/exercise.v1i1.22>
- Kristanto, A. A. (2020). Kontribusi konsentrasi, tinggi badan, panjang lengan, dan persepsi kinestetik terhadap hasil pointing atlet petanque Jawa Timur. *Jurnal Prestasi Olahraga*, 3(1).
- Maizan, I. (2020). Profil *kondisi fisik atlet bolavoli* Padang Adios Club. *Jurnal Performa Olahraga*, 5(1), 12-17.
- Masrun, R. Z. D. P. A. (2020). Kontribusi Antara Motivasi dan Koordinasi Mata-Tangan Dengan Keterampilan Servis Bawah Bolavoli. *Jurnal Patriot*, 2(3), 860–873. <https://doi.org/10.4135/9780857020116.n162>
- Nurhasan. 2001. *Tes dan Pengukuran Dalam pendidikan jasmani*. Jakarta: Badan Proyek Pembinaan Olahraga.
- Ruslan, R. (2021). Pengaruh Metode Latihan Drill Terhadap Keterampilan Servis Bawah Permainan Bola Voli. *Jambura Journal of Sports Coaching*, 3(2), 68–73. <https://doi.org/10.37311/jjsc.v3i2.11337>

- Sahabuddin. (2020). Ektifitas Kelentukan Pergelangan Tangan Dan Kekuatan Otot Lengan Dengan Kemampuan Servis Atas Bolavoli. *SPORTIVE: Journal Of Physical Education, Sport and Recreation*, 4(1), 23. <https://doi.org/10.26858/sportive.v4i1.17168>
- Sahabuddin, Hakim, H., & Muslim. (2021). Kontribusi Kekuatan Otot Lengan, Daya Tahan Otot Tungkai, Dan Koordinasi Mata Tangan Terhadap Kemampuan Passing Bawah Bolavoli. *Journal Coaching Education Sports*, 2(2), 235–250. <https://doi.org/https://doi.org/10.31599/jces.v2i2.748>
- Sahabuddin, Herman, & Windiana, N. (2023). Management of Volleyball Extracurricular Sports Coaching at High School. *Indonesian Journal of Sport Management*, 3(1), 121–127. <https://doi.org/https://doi.org/10.31949/ijsm.v3i1.4168>
- Saparuddin, S. (2019). Pengaruh latihan push-up dan pull-up terhadap kekuatan otot lengan pada atlet panahan perpani kabupaten banjar. *Riyadhoh: Jurnal Pendidikan Olahraga*, 2(2), 36-43.
- Saputra, D. I. M., & Gusniar, G. (2019). Meningkatkan Hasil Belajar Passing Bawah Bola Voli melalui Bermain Melempar Bola. *Gelombang Olahraga: Jurnal Pendidikan Jasmani Dan Olahraga (JPJO)*, 3(1), 64–73. <https://doi.org/10.31539/jpjo.v3i1.862>
- Sudibyoy, Hernawan, & Susilo. (2020). Pengaruh Metode Latihan dan Koordinasi Terhadap Keterampilan Servis Atas Bolavoli. *Jurnal Segar*, 9(1), 31–42. <https://doi.org/https://doi.org/10.21009/segar/0901.04>
- Syaifuddin. (2016). *Anatomi fisiologi*. Jakarta: EGC.
- Syamsi, N., Yarmani, Y., & Arwin, A. (2021). Survei kondisi fisik dan teknik dasar bola voli putra pada masa new normal di klub Sparta Rejang Lebong. *SPORT GYMNASTICS: Jurnal Ilmiah Pendidikan Jasmani*, 2(1), 79-90.
- Wisniarti, & Hermanzoni. (2020). Pengaruh Kekuatan Otot Lengan Dan Daya Ledak Otot Tungkai Terhadap Kemampuan Smash Bolavoli. *Jurnal Patriot*, 2(2), 654–668. <https://doi.org/https://doi.org/10.24036/patriot.v2i2.644>